

What is claimed is:

1 1. An optical polarizing module, comprising:
2 a polarizing beam splitter, reflecting light with a
3 first polarization, defining a first beam, and
4 passing light with a second polarization;
5 a mirror, disposed near the polarizing beam splitter
6 with a predetermined acute angle to reflect
7 light with the second polarization, passing
8 through the polarizing beam splitter again and
9 forming a second beam;
10 a first lens array, having a plurality of first lens
11 cells facing the polarizing beam splitter and
12 disposed near the polarizing beam splitter to
13 couple the first beam and the second beam; and
14 a second lens array with a first surface facing the
15 first lens array and a plurality of second lens
16 cells on the opposite side, wherein the second
17 lens array is disposed parallel to the first
18 lens array at a first distance, the second lens
19 array has a plurality of elongated half-wave
20 plates disposed on the first surface to convert
21 the direction of the first polarization of
22 light in the second beam directed from the
23 first lens array into the direction of the
24 second polarization.

1 2. The module as claimed in claim 1, wherein the
2 polarizing beam splitter is a wire grid polarizing beam
3 splitter.

1 3. The module as claimed in claim 1, wherein the
2 first and second lens arrays are used in an optical
3 system with F-number between $f/1.5$ and $f/3$.

1 4. The module as claimed in claim 1, wherein the
2 first lens array and the second lens array have the same
3 aspect ratio.

1 5. The module as claimed in claim 1, wherein the
2 first and second lens arrays are parallel to an
3 intersection of the extending planes of the polarizing
4 beam splitter and the mirror.

1 6. The module as claimed in claim 5, wherein an
2 elongated axis of each half-wave plate is parallel to the
3 intersection.

1 7. The module as claimed in claim 1, wherein the
2 relationship between the first distance (t) and the
3 predetermined included angle (θ) is $\theta = \frac{d_2}{2t}$, wherein d_2 is
4 the length of the longer side of the second lens cells.

1 8. The module as claimed in claim 1, wherein the
2 half-wave plates are disposed on the first surface
3 parallel to each other at the same intervals.

1 9. The module as claimed in claim 8, wherein the
2 width of each half-wave plate is equal to half the length
3 of the longer side of the second lens cells.

1 10. The module as claimed in claim 9, wherein the
2 intervals of the half-wave plates are equal to half the
3 length of the plurality of second lens cells.

1 11. The module as claimed in claim 10, wherein a
2 central line divides each second lens cell into an upper
3 portion and a lower portion, and the half-wave plates are
4 disposed within the upper portions on the first surface.

1 12. An image projection system, comprising:
2 a light source providing a visible light beam;
3 an optical polarizing module disposed near the light
4 source in the light beam, comprising:

5 a polarizing beam splitter, reflecting light
6 with a first polarization , defining a
7 first beam, and passing light with a
8 second polarization;

9 a mirror, disposed near the polarizing beam
10 splitter with a predetermined acute angle
11 to reflect light with the second
12 polarization, passing through the
13 polarizing beam splitter again and forming
14 a second beam;

15 a first lens array, having a plurality of first
16 lens cells facing the polarizing beam
17 splitter and disposed near the polarizing
18 beam splitter to couple the first beam and
19 the second beam; and

20 a second lens array with a first surface and a
21 plurality of second lens cells on the

22 opposite side, wherein the second lens
23 array is disposed parallel to the first
24 lens array with a first distance; and
25 a plurality of elongated half-wave plates
26 disposed on the first surface to convert
27 the direction of the first polarization of
28 light in the second beam directed from the
29 first lens array into the direction of the
30 second polarization;
31 a display module, displaying an image in accordance
32 with image data fed thereto to modulate the
33 first and second beams provided by the optical
34 polarizing module; and
35 an optical output lens assembly, directing light
36 from the display module and projecting the
37 modulated light.

1 13. The image projection system as claimed in claim
2 12, wherein the light source is a convergent light
3 source.

1 14. The image projection system as claimed in claim
2 12, wherein the polarizing beam splitter is a wire grid
3 polarizing beam splitter.

1 15. The image projection system as claimed in claim
2 12, wherein the incident angle between the light beam and
3 the polarizing beam splitter is between 35° and 55°.

1 16. The image projection system as claimed in claim
2 12, wherein the first and second lens arrays are used in

an optical system with the F-numbers between $f/1.5$ and $f/3$.

17. The image projection system as claimed in claim 12, wherein the first lens array and the second lens arrays have the same aspect ratio.

18. The image projection system as claimed in claim 12, wherein the first surface of the second lens array faces the first lens array.

19. The image projection system as claimed in claim 1, wherein the first and second lens arrays are parallel to an intersection of the extending planes of the polarizing beam splitter and the mirror.

20. The image projection system as claimed in claim 19, wherein an elongated axis of each half-wave plate is parallel to the intersection.

21. The image projection system as claimed in claim 12, wherein the relationship between the first distance (t) and the predetermined angle (θ) is $\theta = \frac{d_2}{2t}$, wherein (d_2) is the length of the longer side of the second lens cells.

22. The image projection system as claimed in claim 12, wherein the half-wave plates are disposed on the first surface parallel to each other at the same intervals.

1 23. The image projection system as claimed in claim
2 22, wherein the width of each half-wave plate is equal to
3 half the length of the longer side of the second lens
4 cells.

1 24. The image projection system as claimed in claim
2 23, wherein the intervals of the half-wave plates are
3 equal to half the length of the plurality of second lens
4 cells.

1 25. The image projection system as claimed in claim
2 24, wherein a central line divides each second lens cell
3 into an upper portion and a lower portion, and the half-
4 wave plates are disposed within the upper portions on the
5 first surface.

1 26. The image projection system as claimed in claim
2 12, wherein the display module is a liquid crystal
3 display, and the distance between the second lens array
4 and the liquid crystal display defines a second distance
5 (1).

1 27. The image projection system as claimed in claim
2 26, wherein the relationship between the length of the
3 plurality of first lens cells (d_1) and the length of the
4 plurality of second lens cells (d_2) is $\frac{d_2}{d_1} = \frac{l}{l+t}$.